Julie Robinson
julie.robinson@flinders.edu.au

IMMIGRANT STUDENTS' ACADEMIC PERFORMANCE IN AUSTRALIA, NEW ZEALAND, CANADA AND SINGAPORE

Asma Akther & Julie Robinson
Flinders University, Adelaide

Abstract

Immigrants to the USA and Western Europe show a disadvantage in academic achievement that persists into the second generation. In contrast, an immigrant advantage is often seen in countries with selective immigration policies. This paper examines whether four countries with selective migration policies continue to show an academic advantage in data from PISA 2012; whether the advantage applies equally across reading, mathematics and science; and whether any advantage can be attributed to greater access to three personal (school belonging, attitude towards school learning activities and outcomes), and two teacher-related academic resources (student-teacher relationship, teacher support). Three groups (first-generation immigrant; second-generation immigrant; native-born) of 15-year-old students were compared in Australia, New Zealand, Canada, and Singapore. In Australia and Singapore, first- and second-generation immigrant students showed an advantage in all three subjects. In New Zealand and Canada, there was no evidence of a consistent immigrant disadvantage. The five academic resources were related to individual differences in PISA scores, but did not account for differences between migrant and native students.

"Immigration is one of the defining issues of the 21st century. It is now an essential, inevitable and potentially beneficial component of the economic and social life of every country and region" (Brunson McKinley, Director General, International Organization for Migration, 2007). As a result, education systems in most countries are now responsible for ensuring that large and diverse populations of immigrant students develop the academic skills and knowledge necessary for successful resettlement.

Although immigration is now a global phenomenon, it remains particularly salient in traditional "countries of immigration" (USA, Canada, Australia, New Zealand). Over 25% of Australia's population are immigrants, and over 46% of Australians are either immigrants or have a parent who was an immigrant (Australian Bureau of Statistics, 2012). Some "countries of immigration", including Australia, New Zealand, Canada and Singapore, are distinctive because a large proportion of their intake of long-term migrants is reserved for skilled workers (Bryant, Genç & Law 2004; Hugo, 2006; Kaushal & Lu, 2014; Pang, 2006).

Past research indicates that immigrant students in the USA and Western Europe show a disadvantage in academic achievement that persists into the second generation (e.g., Organization for Economic Co-operation and Development, 2012). In contrast, an immigrant advantage is often seen in countries with selective immigration policies (e.g., Entof & Minoiu, 2005). However, there are exceptions to these patterns across time, academic subjects, countries, and immigrant groups (e.g., Ma, 2003; Crosnoe & Turley, 2011).

To better understand the factors that influence the academic skills of immigrant students, research would ideally use large, representative samples of students who had completed the same measures of academic skills and knowledge. Thus, the Program for International Assessment (PISA) has been proposed as a useful dataset for examining outcomes for immigrant students in a variety of national contexts (Edele & Stanat, 2011). PISA is a triennial international survey designed to assess nationally representative samples of 15-year-old students' ability to apply their knowledge in reading, mathematics and science to real-life situations (Organization for Economic Co-operation and Development, 2013).

Sociological concepts of cultural capital (linguistic capital, lifestyle, values, dispositions and expectations of particular social groups), social capital (social resources derived from social interactions) and human capital (social resources derived from individual development) were applied

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julie.robinson@flinders.edu.au

in the current research (Gamarnikow, 2003). We compared three groups that differed in cultural capital (native-born, first-generation immigrant, second-generation immigrant). Investigation of social capital focused on two teacher-related resources, the level of social and academic support provided by teachers (Suárez-Orozco, Rhodes, &Milburn, 2009) and the quality of student-teacher relationships (e.g., Brok, Tartwijk, Wubbels, & Veldman, 2010; Wu, Palinkas & He, 2010), and for human capital it focused on three personal resources (sense of belonging to school (e.g., Sánchez, Colón & Esparza, 2005), attitude towards school learning activities (Greenman, 2013; Reeve, 2012) and attitude towards school learning outcomes (e.g., Vansteenkiste, Lens & Deci, 2010).

The research had three aims: to determine whether adolescent immigrants to four countries with selective migration policies continue to show an academic advantage in the most recent data from PISA; to examine whether this advantage applies across three academic domains (reading, mathematics and science); and to explore whether any advantage shown by immigrant students can be attributed to greater access to three personal and two teacher-related academic resources.

Method

Participants

This study uses the data from the 2012 cycle of PISA for four countries with selective migration policies: Australia, New Zealand, Canada and Singapore. Within-country comparisons were made between three groups: First-generation immigrant students (child and both parents born overseas); second-generation immigrant students (child born in test country, both parents born overseas); native-born students (child and both parents born in test country) (Table 1).

Table 1. PISA 2012 sample sizes for first- and second-generation immigrants and native-born students in four countries with selective migration

	Comparison groups		
Country	Native-born population (n = 28,794)	Second-generation immigrants (n = 3,869)	First-generation immigrants (n = 4,266)
Australia	8430	1233	1170
New Zealand	2346	376	681
Canada	14687	1953	1752
Singapore	3331	307	663

Measures

Academic skills

Students completed tests of academic skills in reading, mathematics and science that lasted for 2 hours (Organization for Economic Co-operation and Development, 2013). The tests included open-ended and multiple-choice questions that were organised around scenarios relating to real-life situations. Students completed different combinations of different tests so that data are available for each country on test items that would have taken a total of about 390 minutes to complete. Because no individual student completes all items, students receive six "plausible values" that estimate their total score for each academic subject. To facilitate comparisons between the 34 OECD, the plausible values for mathematics, science and reading scores are reported in the form of standardized scores with a mean of 500 and a standard deviation of 100. The performance of students in countries that are not members of OECD (e.g., Singapore) is also reported in terms of the OECD standardized scores.

Migration status and personal and teacher-related educational resources

Students also completed questionnaires about their background, attitudes and school experiences (Organization for Economic Co-operation and Development, 2013). Students' migration status was

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julie.robinson@flinders.edu.au

assigned on the basis of their reports of their own country of birth and that of their parents.

Three personal educational resources were assessed. Students' attitudes towards school learning outcomes and school learning activities were measured by self-reports about the importance of school for their future and the importance of, and pleasure they derive from, participating in learning activities, respectively. Students' sense of belonging to their school was measured by their self-reports about their feelings of social connectedness, happiness and satisfaction at school. All items were measured on a four-point Likert scale (strongly agree to strongly disagree).

Two teacher-related educational resources were also assessed. The measure of the quality of teacher-student relations assessed students' perceptions of the level of interest that teachers showed in student wellbeing and the fairness with which students were treated. The measure of teacher support assessed students' perceptions of the overall level of social and academic support that teachers provided to students at their school. Higher values on this index indicate positive teacher-student relations and higher levels of support from teachers.

Statistical analysis

STATA version 13.0 was used for data management and analysis. To enhance the validity of cross-country comparisons, anchored scores were used for educational resources (King & Wand, 2007; Kyllonen & Bertling, 2013).

PISA data were structured hierarchically (i.e., students were nested within schools, which were nested within countries). For aim 1 and 2, a maximum likelihood estimation procedure was used to compare differences between the three migration-status groups. The model examined group effects (mean scores in the first- and second-generations compared to the native-born children). To fulfil Aim 3, a multilevel mixed-effect linear regression analysis was applied in STATA using the *xtmixed* command to fit linear mixed models of academic skills. The results from this model are presented as β coefficients with 95% confidence intervals; p values of less than 0.01 were considered statistically significant.

Results

Within-country comparisons between migration-status groups

In Australia and Singapore, first- and second-generation immigrant students showed an advantage in all three academic subjects (Table 2). In Australia, this advantage is partly attributable to the relatively low performance of native-born students. This is not the case in Singapore, which also showed a marked first- and second-generation immigrant advantage. In New Zealand and Canada, the pattern of performance differed across academic domains, but in all cases first- and second-generation immigrants showed performance similar to, or slightly better than, that of native-born students.

The unadjusted mixed-effects model provided additional informational information about the magnitude and direction of the difference between the immigrant and native-born groups (Table 3). For first generation immigrants, Beta values for mathematics were positive in all four countries. In Australia, a statistically significant immigrant advantage was seen in all subjects, and the magnitude of the Beta values for second-generation immigrants was double that for first-generation immigrants. A generally similar pattern was seen in Singapore. In contrast, in New Zealand, there was no statistically significant advantage for first generation immigrants in any subject, and there was a statistically significant disadvantage in science for second-generation immigrants. Canada showed a third distinctive pattern, with first-generation immigrants showing a statistically significant advantage and mathematics and reading, and second-generation immigrants retaining the advantage in reading.

Julie Robinson
julie.robinson@flinders.edu.au

Table 2. PISA 2012 scores in three academic domains for first- and second-generation immigrants and native-born students in four countries with selective migration policies

	Native-born population (n = 28,794)		Second-generation immigrants (n = 3,869)		First-generation immigrants (n = 4,266)		Difference between groups	
Academic skills	M	(SD)	M	(SD)	M	(SD)	Eta^2	95% CI
Mathematics								
Australia	487.1	(94.0)	535.8	(103.2)	513.3	(99.7)	0.029	(0.023-0.035)
New Zealand	498.0	(94.8)	494.3	(107.0)	512.4	(107.1)	0.004	(0.001-0.009)
Canada	510.5	(85.2)	511.4	(86.6)	519.1	(92.4)	0.001	(0.0002-0.002)
Singapore	562.6	(105.1)	599.6	(103.0)	586.3	(101.0)	0.013	(0.007-0.02)
Reading								
Australia	496.0	(97.3)	537.0	(97.5)	516.4	(102.6)	0.019	(0.015-0.025)
New Zealand	513.3	(101.9)	501.2	(109.6)	516.2	(109.8)	0.002	(0-0.005)
Canada	512.0	(89.1)	519.8	(89.9)	519.3	(95.9)	0.001	(0.0003-0.002)
Singapore	533.4	(99.5)	573.6	(97.8)	543.1	(101.8)	0.011	(0.01-0.02)
Science								
Australia	508.4	(99.9)	543.9	(103.6)	519.1	(105.9)	0.012	(0.008-0.017)
New Zealand	518.9	(98.8)	496.1	(111.1)	517.6	(111.1)	0.005	(0.001-0.010)
Canada	517.8	(87.1)	511.3	(91.8)	514.3	(98.1)	0.001	(0-0.001)
Singapore	541.4	(102.8)	585.6	(102.4)	558.0	(104.4)	0.014	(0.01-0.02)

Table 3. PISA 2012 unadjusted mixed effects regression model for scores in three academic domains for first- and second-generation immigrants and native-born students in four countries with selective migration policies

	Mathematics		Reading		Science	
Group	β	(95% CI)	β	(95% CI)	β	(95% CI)
Australia						
Native-born students	-		-		-	
Second-generation immigrants	49.4	(43.8-55.0)**	40.9	(35.2-46.6)**	35.9	(30.0-41.7)**
First-generation immigrants	25.5	(19.8-31.2)**	19.9	(14.1-25.7)**	10.6	(4.7-16.6)**
New Zealand						
Native-born students	-		-		-	
Second-generation immigrants	-1.7	(-12.2-8.7)	-9.7	(-20.7-1.2)	-20.8	(-31.6--10.0)**
First-generation immigrants	14.0	(5.8-22.2)	0.2	(-8.3-8.8)	-3.6	(-12.1-4.8)
Canada						
Native-born students	-		-		-	
Second-generation immigrants	1.3	(-2.6-5.3)	9.0	(5.0-13.1)**	-4.8	(-8.8--0.8)
First-generation immigrants	7.9	(3.7-12.0)**	7.7	(3.5-12.0)**	-3.4	(-7.7-0.8)
Singapore						
Native-born students	-		-		-	
Second-generation immigrants	37.5	(25.7-49.4)**	39.8	(28.6-51.1)**	43.5	(31.8-55.2)**
First-generation immigrants	23.8	(15.4-32.3)**	7.7	(-0.3-15.7)	15.2	(6.9-23.6)**

** $p < .01$

In most cases, the pattern of academic advantage for first- and second-generation immigrant students that was observed in the unadjusted model remained after statistically adjusting for individual differences in the five education resources (positive teacher-student relations, academic support from teachers, positive student attitudes towards learning outcomes and activities, and a sense of belonging to their school) (Table 4). This was the case even though all five resources contributed to individual differences in students' academic scores for more than one subject and in more than one country.

Julie Robinson
julie.robinson@flinders.edu.au

Table 4. PISA 2012 mixed effects regression model for scores in three academic domains for first- and second-generation immigrants and native-born students in four countries with selective migration policies after adjusting for five academic resources

	Mathematics		Reading		Science	
Variable	β	(95% CI)	β	(95% CI)	β	(95% CI)
Australia						
Native-born students	-		-		-	
Second-generation immigrants	43.5	(36.9-50.0)**	35.0	(28.5-41.5)**	29.8	(23.0-36.6)**
First-generation immigrants	20.7	(13.9-27.5)**	14.8	(8.1-21.5)**	6.3	(-0.7-13.3)
Teacher-student relations	14.6	(10.7-18.5)**	20.5	(16.6-24.4)**	19.2	(15.1-23.2)**
Support from teachers	9.5	(7.5-11.6)**	6.5	(4.4-8.6)**	7.7	(5.5-9.8)**
Attitude to learning outcomes	17.7	(13.5-21.8)**	20.9	(16.8-25.0)**	22.4	(18.1-26.6)**
Attitude to learning activities	-0.6	(-4.0-2.7)	0.9	(-2.4-4.2)	-2.3	(-5.8-1.1)
Sense of belonging	-3.2	(-7.1-0.7)	-8.8	(-12.6--4.9)**	-8.0	(-12.0--4.0)**
New Zealand						
Native-born students	-		-		-	
Second-generation immigrants	-10.9	(-23.3-1.6)	-21.0	(-33.9--8.2)**	-31.6	(-44.3--18.8)**
First-generation immigrants	8.7	(-0.9-18.4)	-4.7	(-14.6-5.3)	-10.0	(-19.9--0.1)
Teacher-student relations	12.1	(5.4-18.9)**	14.2	(7.3-21.1)**	15.5	(8.6-22.4)**
Support from teachers	4.8	(0.8-8.7)	3.5	(-0.5-7.6)	4.6	(0.6-8.7)
Attitude to learning outcomes	30.7	(23.6-37.8)**	30.8	(23.5-38.1)**	35.5	(28.2-42.8)**
Attitude to learning activities	-9.9	(-15.5--4.3)**	-5.6	(-11.4-0.2)	-11.7	(-17.4--5.9)**
Sense of belonging	-7.5	(-14.7--0.4)	-7.6	(-14.9--0.2)	-10.4	(-17.7--3.2)**
Canada						
Native-born students	-		-		-	
Second-generation immigrants	0.2	(-4.5-5.0)	6.0	(1.2-12.9)	-6.2	(-11.0--1.4)
First-generation immigrants	8.1	(3.1-13.0)	5.9	(0.9-10.6)	-4.5	(-9.5-0.5)
Teacher-student relations	10.0	(7.3-12.7)**	10.1	(7.4-12.9)**	10.3	(7.6-13.0)**
Support from teachers	3.8	(2.3-5.3)**	2.6	(1.1-4.1)	3.9	(2.3-5.3)**
Attitude to learning outcomes	10.1	(7.3-12.8)**	13.6	(10.9-16.4)**	11.4	(8.6-14.1)**
Attitude to learning activities	0.2	(-2.2-2.6)	2.4	(-0.1-4.8)	1.1	(-1.3-3.6)
Sense of belonging	-1.2	(-4.0-1.5)	-2.7	(-5.4-0.1)	-1.4	(-4.2-1.3)
Singapore						
Native-born students	-		-		-	
Second-generation immigrants	36.8	(23.4-50.2)**	39.3	(26.6-51.9)**	43.0	(30.0-56.0)**
First-generation immigrants	24.4	(14.6-34.2)**	8.7	(-0.6-18.0)	15.6	(6.0-25.1)**
Teacher-student relations	15.0	(8.0-22.0)**	9.7	(3.1-16.4)**	12.3	(5.5-19.2)
Support from teachers	6.7	(2.7-10.7)**	7.9	(4.1-11.7)**	6.1	(2.2-10.0)**
Attitude to learning outcomes	24.7	(17.5-32.0)**	27.0	(20.1-33.8)**	27.5	(20.5-34.6)**
Attitude to learning activities	-10.7	(-16.5--4.8)**	-7.9	(-13.4--2.4)	-12.1	(-17.8--6.4)**
Sense of belonging	-0.7	(-8.2-6.8)	0.8	(-6.3-7.9)	3.8	(-3.5-11.1)

** $p < .01$

Discussion

The most recent PISA data confirm that first- and second- generation immigrants to four countries with selective immigration policies show little evidence of the persistent immigrant disadvantage in academic skills that has been widely reported in the USA and Western Europe. Indeed, the data confirm that first- and second-generation immigrants to some countries with selective immigration policies (Australia and Singapore) consistently show levels of academic skills that are superior to those of native-born students.

Previous research has struggled to find an evidence-based explanation for observed patterns of immigrant advantage or disadvantage. This study also had limited success in identifying proximal

factors that could explain the immigrant advantages it documented. Although the five personal and teacher-related educational resources that were the focus of this study contributed to individual differences in PISA scores, they did not account for differences between immigrant and native-born students. Most patterns of immigrant advantage and disadvantage remained after the variance in scores attributable to these resources had been accounted for.

The successful integration of child immigrants and the children of adult immigrants is a benchmark for the success of a country's migration, education and social policies. The absence of an immigrant disadvantage in Australia, New Zealand, and Canada has previously been attributed to these countries' selective migration policies (Entorf & Minoiu, 2004). However, empirical evidence to support or refute such a proposition is almost impossible to obtain. Although the findings of the present study are consistent with this interpretation, it provides no evidence of cause-and-effect. The wide range of other factors that distinguish the populations, and social and education policies of these countries from those in the USA and Western Europe offer alternative explanations for the pattern of findings. In particular, education policy in Australia, New Zealand and Canada provides intensive support for language learning and orientation to the new school system for newly arrived immigrant students. These resources are absent or very limited in the USA and Western Europe. In addition, most traditional countries of migration have well developed social and health systems specially designed for immigrants (e.g., multicultural resource centres, migrant health service, Adult English Learning Centres).

One implication of the findings is that, despite their differences, the migration, education, and social policies in Australia, New Zealand, Canada and Singapore have been successful in facilitating equity of educational opportunities and outcomes for most child immigrants and children of adult immigrants. This success is in marked contrast to the outcomes in many other Western countries.

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Declaration of competing interests

The authors declare that there is no conflict of interest.

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Julie Robinson
julie.robinson@flinders.edu.au

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